

LEBT Chopping with One Split Electrode

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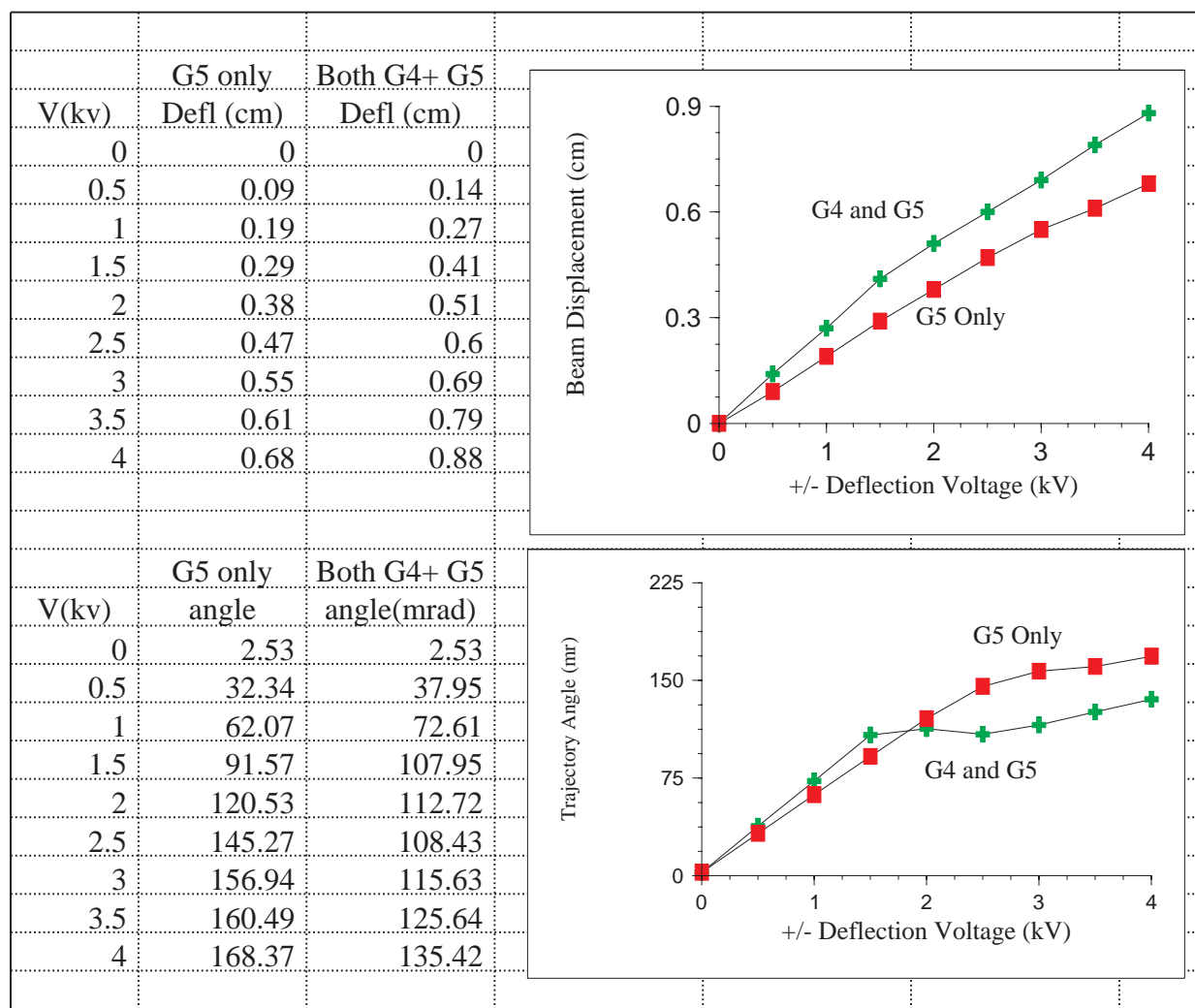
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With a higher-voltage LEBT chopping power supply, it may be possible to eliminate driving Grid 4 with a chopping waveform and just drive Grid 5. It would be an advantage not to split Grid 4, simplifying the mechanical construction of the column.

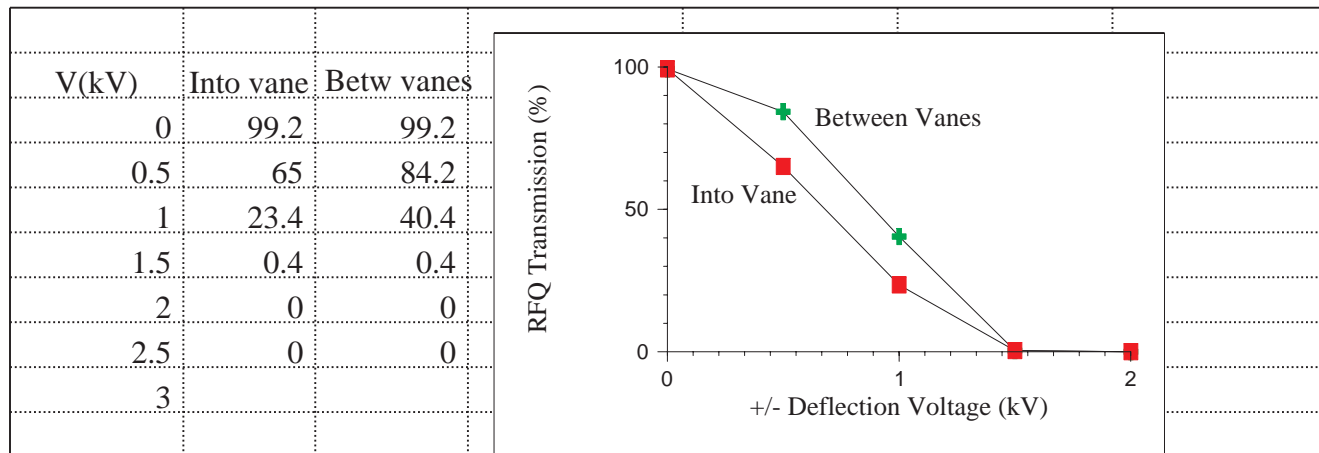
The following plots show the beam centroid and angle deviation at the RFQ vane entrance as a function of the deflecting voltage for both Grid 4 and 5 simultaneously pulsed, and Grid 5 only pulsed. The deflection voltage is supplied symmetrically across the gap: up to ± 4 kV total voltage is plotted here.



The deflection and angle given the beam with just Grid 5 driven is shown in red, with the other data in green. Note that although the displacement (deflection) is smaller with only Grid 5 for the same voltage

across the gap, the deflection angle actually is larger at high voltage with only one electrode driven. This is due to a focusing effect in the non-linear field region between Grid 4 and Grid 5 for large displacements of the centroid of the beam from the axis.

The acceptance of the RFQ is calculated for the values of deflection (displacement) and angle as a function of the voltage on each electrode. The beam may be driven into the end of one vane (red) or into the space between the two vanes (green).



The beam accelerated through the RFQ is extinguished with a voltage above ± 1.5 kV across the plates, but most of the beam misses the 4-jaw at the LEBT ground end. A voltage of ± 3 kV across the plates places most of the beam on the 4-jaws ($>80\%$), leaving the remaining 20% to be lost in the RFQ.